United States Patent

Patton

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[45] **Jan. 18, 1972**

[54] RAIL-TRANSPOSING MACHINE

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[52] **U.S. Cl.** **104/1,** 104/2

[51] **Int. Cl.** **E01b 29/16**

[58] **Field of Search** 104/1, 2, 3–6

[56] **References Cited**

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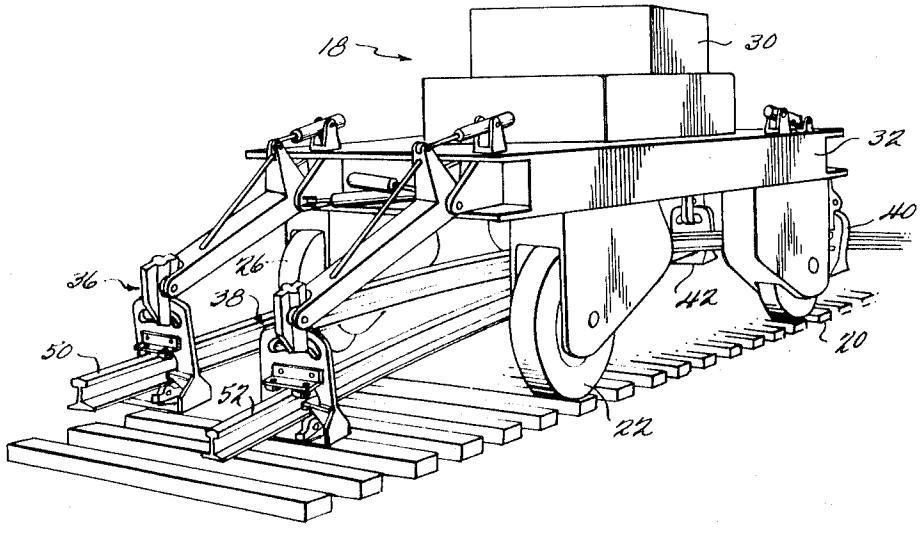
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[57] **ABSTRACT**

A method and apparatus for transposing a pair of railroad rails. In the embodiment of the invention described below, a self-propelled rail-transposing machine having a pair of rail threader eyes at both the front and rear of the machine is provided, with the two rails being threaded through these four eyes so that they cross beneath the machine. Hydraulic cylinders are preferably included for moving the eyes vertically and horizontally and for individually tilting the threader eyes to twist the rails so that, on double-shoulder tie plates, the rails will come over the shoulder when spikes are pulled only on one side of the rail. Further, a hydraulic clamp and thrust jack is provided on the machine for moving up to a quarter mile or so of a rail along its length in either direction to realign transposed rails having staggered joints.

3 Claims, 8 Drawing Figures



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SHEET 1 OF 3

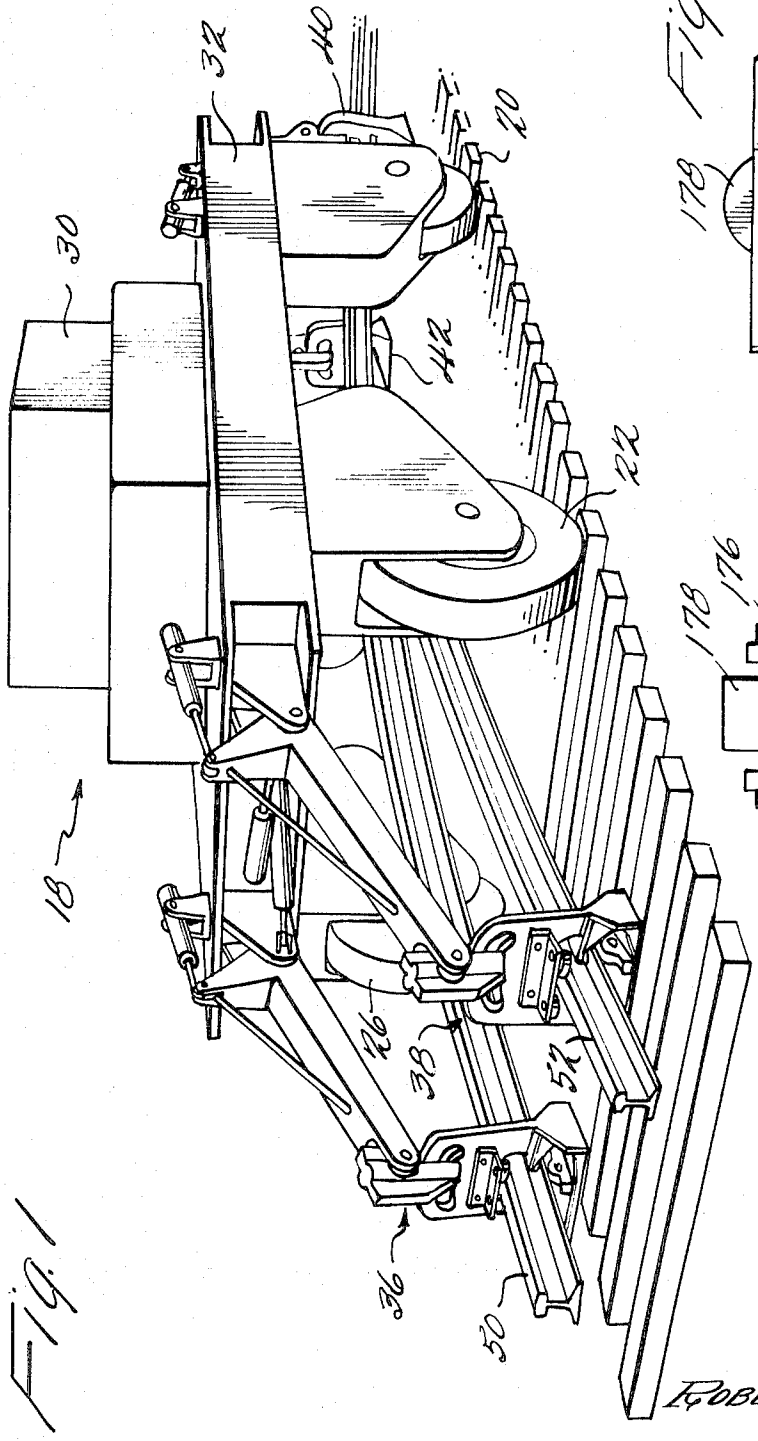


FIG. 1

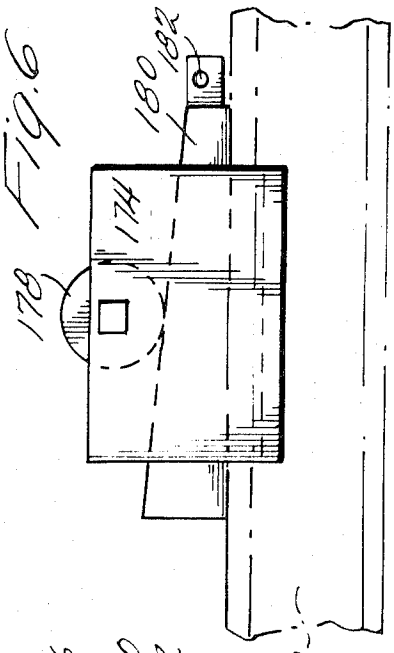


FIG. 6

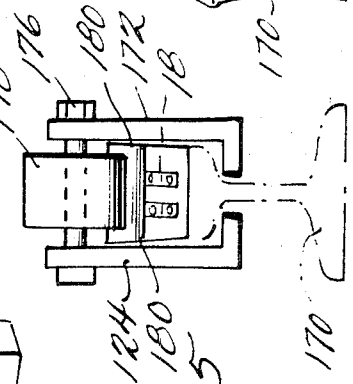


FIG. 5

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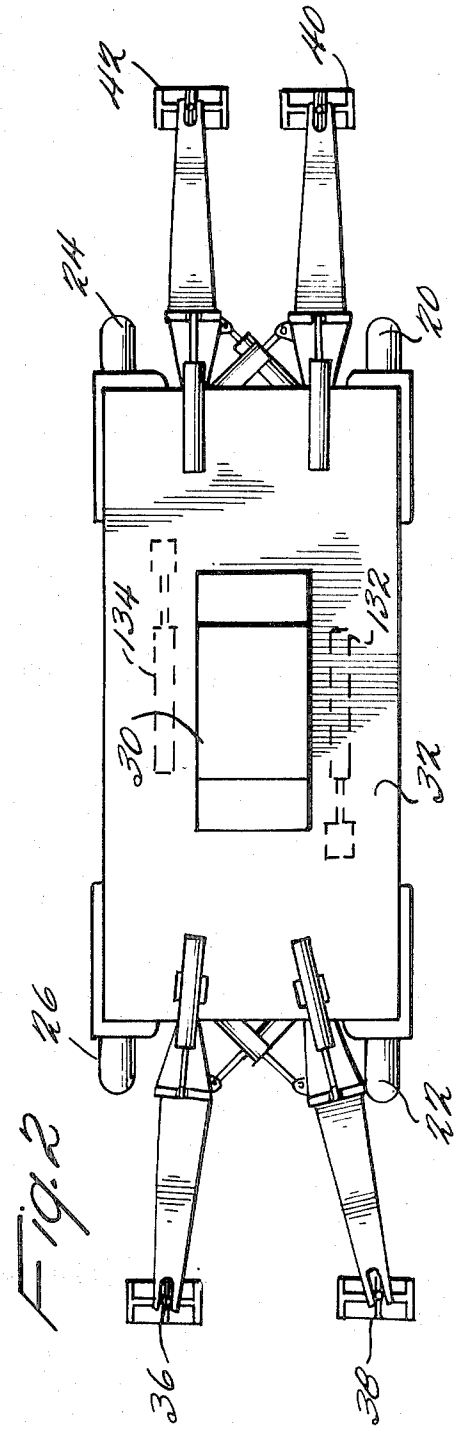


Fig. 2

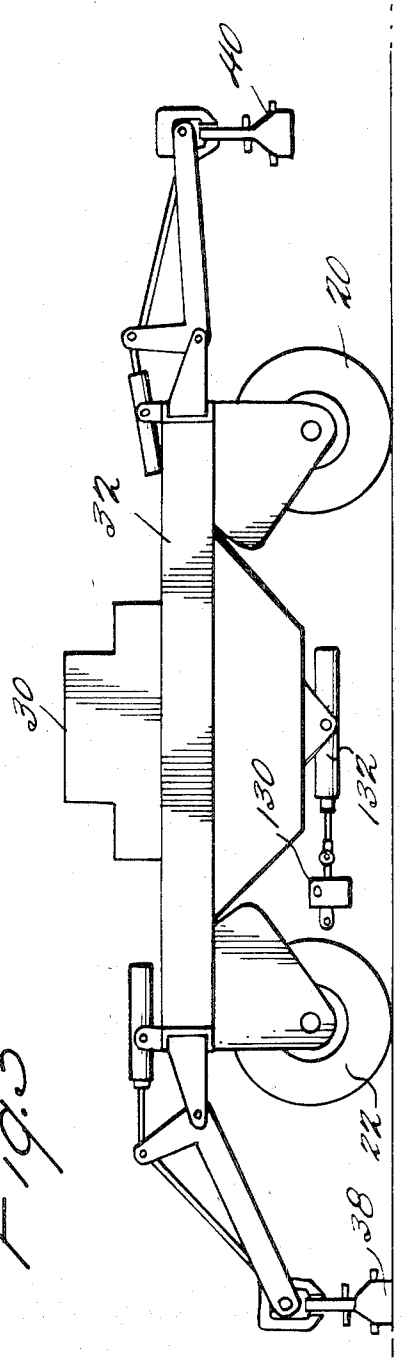


Fig. 3

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Fig. 4

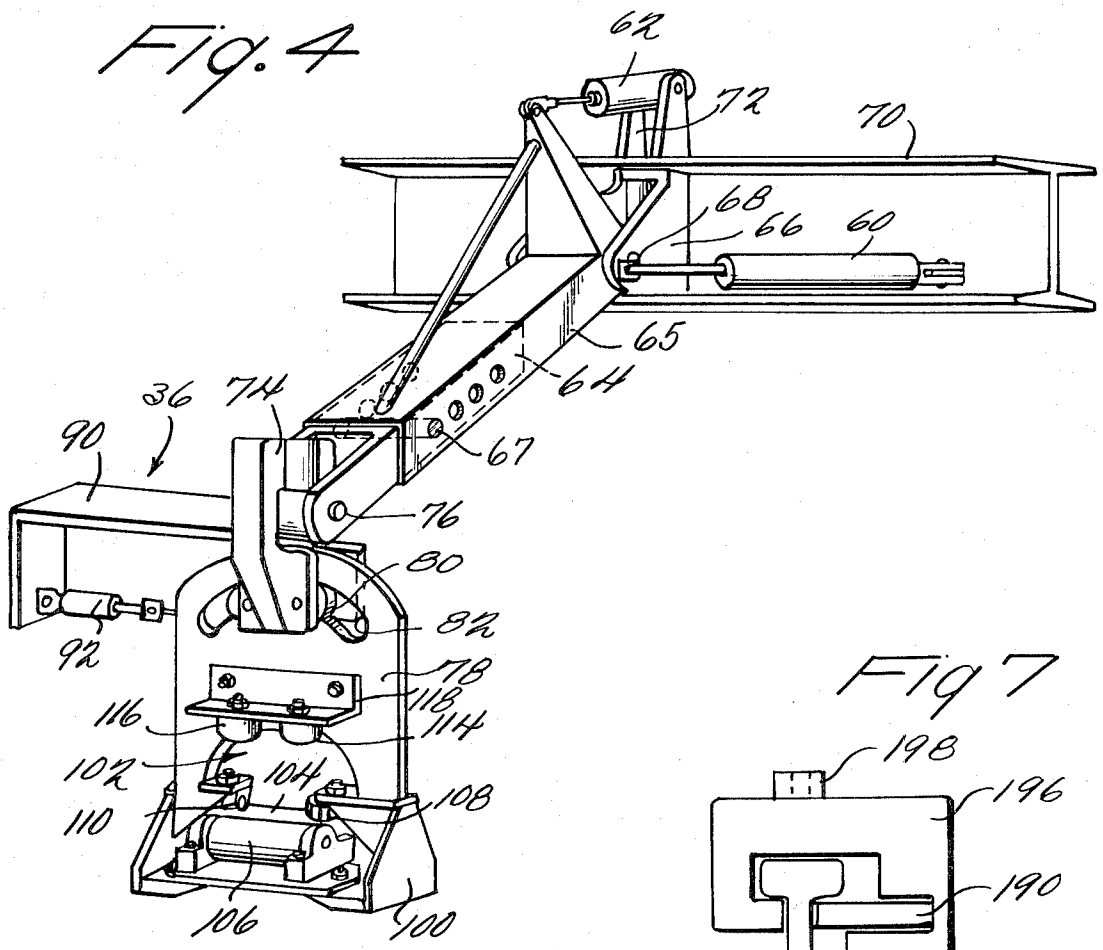


Fig 7

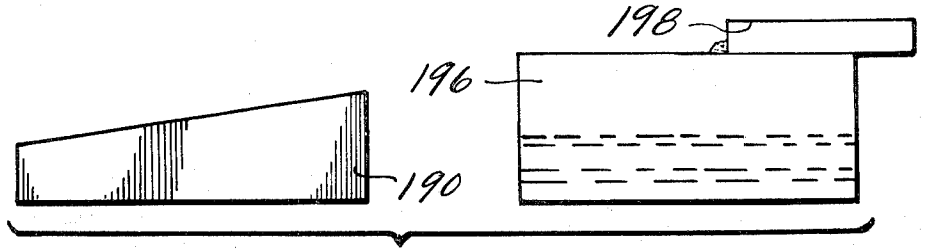


Fig 8

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RAIL-TRANSPOSING MACHINE

BRIEF DESCRIPTION OF THE PRIOR ART AND SUMMARY OF THE INVENTION

The invention relates to a method and apparatus for transporting a pair of railroad rails.

It has been known for many years that the lifetime of track rails can be considerably increased by reversing their positions after considerable wear. This is true, at least in part, because the rails tend to wear individually according to their particular placement. Generally on curves, the rails on the low side of the curve tend to flatten out due to the increased train weight, while the rails on the high side tend to narrow down due to the wearing action of contact with the wheel flanges. Similar effects can be observed on rails at other locations where the load, and hence the wear, on one rail differs from the load on the other rail. Transportation of the rails can thus considerably increase the useful life of the rails and is an economical and worthwhile expedient.

In the past, rails have been transposed by simply disconnecting the individual rails and then using a crane or a work crew to physically move one rail out of the way, then to move the other rail into the position previously occupied by the first rail, and finally to move the displaced first rail into the remaining vacated position. These time-consuming and laborious procedures are not only expensive and a ready source of accidents, but also are wholly inadequate for dealing with welded rails which may be up to a quarter mile or longer in length. Some railroads weld the welded rail strands together after the rail strands are laid; they then become indeterminate lengths.

A machine which is is capable of transposing one rail at a time is described in U.S. Pat. to Striebel, No. 3,332,357, issued July 25, 1967. In this arrangement, bulldozers each having a threader tube mounted on a side are employed to transpose the rails, each moving one rail at a time. A laborious procedure involving several different machines and steps is required to reverse the rails.

The present invention relates to a rail-transposing apparatus and method whereby both rails can be simultaneously transposed by a single machine which crosses the rails and which moves under its own power down the track carrying the point of crossing with it. In the embodiment of the invention described below, this machine is provided with a pair of adjustable rail threader eyes at both its front and rear for receiving the rails. Each of these threader eyes is movable vertically and horizontally by means of hydraulic cylinders for properly engaging the rails and manipulating team as necessary for transportation. Each of the two rails enters an eye at the front and at one side of the machine and exits via a similar eye at the rear and at the opposite side of the machine so that the rails cross beneath the machine with one rail moving atop and past the other. The eye passages through which the rails move are themselves adjustable for different heights and widths of rails, and rollers at the bottom and sides of the passage for moving the rails through the passage are preferably provided.

Further, it has been discovered that, for rails fastened with double-shoulder tie plates, if the rails are twisted as they are fed through the front rail threader eyes, it is necessary only to remove the spikes on one side of each of the rails, because twisting causes the rails to come up over the shoulder and thus eliminates the necessity to remove all of the spikes before proceeding. Twist is also caused by rear threader eyes to place the rails back in place on the tie plates. This twist lets the base of the rail go under the spike heads on the side so that spikes were not pulled. The twisting action of the rail threader eyes is preferably accomplished by use of another set of hydraulic cylinders or gears each mounted adjacent one of the eyes.

Moreover, especially with long rails such as the conventional quarter-mile or so welded rails now used widely, rail joints are frequently staggered for the rail pair so that the joint on one of the pair of rails to be transposed will be located a few feet down the track from the accompanying joint of the other of the pair of rails. Thus, if the rails are just switched, one of the transposed rails will be a few feet short of its new joint while the other transposed rail will have a few overlapping feet of extra rail at its joint. In the aforementioned Striebel patent this problem was overcome by cutting the overlapping length from the one rail and adding a section, such as the removed length, to the rail was short of its joint. This procedure, however, is obviously laborious, time consuming, expensive, and generally unsatisfactory.

According to one aspect of this invention the rails are pushed or pulled along their length so as to be realigned with their new joints. In the embodiment of the invention described in detail below, a clamp for firmly attaching to the rail and a thrust jack hydraulic cylinder connected to the clamp are provided for each rail with the jack attacked to the transposing machine. Accordingly, when all of the spikes on one or both sides holding the rails in place have been removed or the rails have been otherwise freed so as to be movable along their length, each of the rail clamps can be firmly attached to a rail, and the hydraulic cylinders associated therewith operated to push or pull the rails the desired distance along their length while the rail-transposing machine remains in place. After the rails have been moved a distance sufficient to correctly align the rails after transportation, the rails can then be threaded through the eyes so that they cross beneath the machine and the machine moved toward the other end of the rails, carrying the crossing point with it. Preferably, after the machine has moved a short distance the rear rail ends are permanently fastened to their new joints before the machine moves onward to complete the transportation of the rails. Connecting the rear ends in this fashion helps ensure that the rails will be transposed so as to lie in their correct new locations on the tie plates so they can be refastened in place without additional work after transportation is completed.

Thus, the novel method and apparatus of this invention permits a pair of rails to be transposed quickly, cheaply and safely by the use of a single machine which is also provided with means to move the rails along their length for alignment with staggered joints.

Many other objects and purposes of the invention will, of course, become clear from the following detailed description of the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows the novel rail-transposing machine of this invention in perspective.

FIG. 2 shows a top view of the transposing machine of FIG. 1.

FIG. 3 shows a side view of the rail-transposing machine of FIG. 1.

FIG. 4 shows a detailed perspective view of the adjustable rail eye threader.

FIG. 5 shows a front view of the rail clamp for holding the rail in position while it is moved along its length.

FIG. 6 shows a side view of the rail clamp of FIG. 5 with a rail clamped in position for pushing or pulling.

FIG. 7 shows an end view of a modification of the rail clamp of FIGS. 5 and 6.

FIG. 8 shows a side view of the rail clamp of FIG. 7.

DETAILED DESCRIPTION OF THE DRAWINGS

Reference is now made to FIGS. 1, 2 and 3 which show a perspective, top and side view, respectively, of the novel rail-transposing machine 18 of this invention. As can be seen, machine 18 is in effect a vehicle and is provided with four wheels 20, 22, 24 and 26. These wheels are each preferably powered by a suitable engine designated generally at 30. It will, of course, be understood that any conventional engine which provides sufficient power to move the machine while transposing the rails can be employed. The engine 30 also includes suitable pumps or other conventional devices for providing hydraulic pressure sufficient to operate the various

hydraulic jack cylinders described below which move the rails along their length and which control the positions of the four threader eyes. The engine 30 is mounted on a solid frame 32 which is suitable to support it and to solidly provide a base for the two pairs of threader eyes which are mounted on it.

As discussed briefly above, the machine 18 is provided with four threader eyes 36, 38, 40 and 42. Each of these eyes is substantially identical and is controlled by similar hydraulic cylinders to that the eyes at either end can guide the rails into machine 18 or out of machine 18. For the purposes of explanation, it is assumed that the machine 18 illustrated in FIGS. 1–3 is moving to the left so that rail 50 enters eye 36 and exits through eye 40, while rail 52 enters through eye 38 and exits through eye 42. Thus, the rails 50 and 52 cross beneath the machine 18 and, in the embodiment shown in FIGS. 1–3, rail 50 crosses over rail 52. As should be apparent from the discussion below, the vertical position of the four eyes 36, 38, 40 and 42 can be independently adjusted by the associated hydraulic cylinders as necessary so that rails 50 and 52 will pass one over the other without difficulty.

Reference is now made to FIG. 4 which shows one of the rail threader eyes 36 in detail. All of the four eyes are preferably substantially identical to the eye 36 and are operated in the same manner. As discussed briefly above, the eye 36 is capable of being moved both horizontally and vertically so that the rails can be properly crossed beneath the machine and so that the eyes 36, 38, 40 and 42 can be moved downward to engage the rails and to make sure that the rails are correctly moved to their new positions.

In the embodiment of the invention shown in FIG. 4, eye 36 is made adjustably extensible by the telescopic relation of members 64 and 65 as shown. A lockpin 67 is provided to couple together members 64 and 65. The ability to extend the eyes permits the novel machine to also be used to pick up strings of rail stored along the track. If desired, a hydraulic cylinder or similar device can be used to extend the eye 36.

Moreover, when rails are transposed, it is sometimes necessary or at least desirable to adze the ties under one rail. By adjusting the horizontal position of the eyes through which one rail feeds, that rail can be placed in the center of the track or on the heads of the ties so that the ties can then be adzed. Similarly, if desirable, both rails can be placed in the center of the track or at other suitable locations by displacing the threader eyes horizontally.

The horizontal position of the threader eye 36 and similarly the other eyes 38, 40 and 42 is controlled by a lateral deflecting cylinder 60 shown in FIG. 4. This cylinder is connected to a suitable source of hydraulic pressure which may be associated with the engine 30. Similarly, the vertical position of the eye 36 is controlled by a similar rail-lifting cylinder 62 which is connected to the arm member 65. As shown in FIG. 4, arm member 65 is pivotably connected to bracket 66 so as to be rotatable about the rod 68 which attaches it to bracket 66. Similarly, bracket 66 is connected to eye beam 70, which forms a part of the frame 32, and is likewise pivotable about the rod 72 which connects bracket 66 to member 70. By this connection, arm member 65, and hence eye 36, can be deflected both vertically and horizontally by the cylinders 60 and 62.

Similarly, at the end opposite from the cylinder 60 and 62, arm member 64 is pivotably connected via a rod 76 to another arm member 74. Member 74 is in turn connected to a guide member 78 by a rod 80 which is slidably mounted in a curved slit 82 of guide member 78. As shown in FIG. 4, the slit 82 is curved so that guide member 78 can be in effect rotated about the center of curvature of slit 82 by movement of rod 80 along slit 82. Another arm member 90 is firmly attached to arm member 64 at the end adjacent the connection of member 64 to member 80, and attached to member 90 is another hydraulic cylinder 92 which is connected also to guide member 78 so as to exert a force against the guide member 78 which causes guide member 78 to rotate about the center of curvature of slit 82. As discussed briefly above, the rotation of member 78 twists a rail lodged in the passage through member 78 so that, when dealing with rails held by a double-shoulder tie plate, the twisted rail slips over the shoulder when the spikes on only one side have been removed.

A rail base guide 100 is permanently and adjustably attached to member 78 and together with member 78 defines a passage 102 through which a rail can slide. Rail base guide 100 is preferably provided with a pair of rollers 104 and 106 which each have their axes perpendicular to the direction which the rails move through passage 102 and which engage the bottom of the rail and assist it in moving through passage 102. Further, two side rollers 108 and 110 are also provided having their axes perpendicular to the axes of rollers 104 and 106 and also perpendicular to the direction which the rail moves through passage 102 so that rollers 108 and 110 engage the sides of the base of the rail. The separation between rollers 108 and 110 is preferably adjustable for use with rails of differing widths. Further, two or more rollers 114 and 116 are also preferably provided near the top of passage 102 to engage the sides of the rail near the top of the rail. The axes of rollers 114 and 116 are preferably substantially in parallel with the axes of rollers 108 and 110. These guide rollers 114 and 116 are preferably mounted on a bracket 118 which is adjustable vertically to provide for different rail heights. Slot holes in bracket 118 can be used to provide a variety of heights. Clearance is preferably provided between rollers 114 and 116 for angle bars, nuts and bolts.

As discussed briefly above, another aspect of the invention involves moving the rails a distance along their length in order to match the transposed rails properly with staggered joints. This is preferably accomplished by first freeing the rails so that they are movable along their length and then pushing or pulling the rails to the appropriate positions. In the embodiment of FIGS. 1–3 the same machine 18 which transposes the rails also can be used to move the rails along their length.

As shown in FIGS. 1–3, a rail clamp such as rail clamp 130 is preferably provided for each rail, and cylinders 132 and 134 are connected to the rail clamps for pushing or pulling the rails after they have been fixed to the rail clamps such as clamp 130. As shown, cylinders 132 and 134 exert a force in opposite directions since normally one rail will be moved in one direction and the other rail will be moved in the opposite direction. Further, each of the hydraulic cylinders 132 and 134, as can be seen in FIG. 3, is preferably pivoted intermediate its ends about a rod which is attached to the frame 32 so that cylinders 132 and 134 can push or pull directly on the rails at an angle to the horizontal.

Reference is now made to FIGS. 5 and 6 which show one rail clamp for use with the arrangement shown in FIGS. 1–3. As can be seen in FIGS. 5 and 6, a rail 170 is placed between the two parts 172 and 174 of the clamp 130 so that the top of the rail 170 is located within clamp 130. A clamp bolt 176 is further provided to connect together the members 174 and 176, and a roller 178 is included to interact with the wedge 180 to lock the clamp 130 firmly against the rail. To place the clamp over the rail, the bolts are loosened and the sides then opened to get over the ball of the rail, and then the clamp bolt 176 is tightened firmly in place. As can be seen in FIG. 6, the wedge 180 is further provided with an eye 182 which connects to cylinder 132 so that when the associated hydraulic cylinder is actuated to pull the wedge 180 to the right of FIG. 6, the wedge locks the rail 170 and portions 172 and 174 firmly together, and the entire rail, which may be up to a quarter of a mile in length, is moved along its length for the desired distance.

FIGS. 7 and 8 show a modification of the arrangement of FIGS. 5 and 6 for clamping the rail firmly in place. In FIG. 7 the taper wedge 190 is mounted adjacent to underneath of the ball of rail 194, and the clamping member 196 is provided with an eye 198 to which the cylinder is attached. When the cylinder pulls on the eye 198 and urges the member 196 to the right in FIG. 8, the taper wedge 190 lodges member 196 firmly against rail 194 and the rail 194 is moved along its length for the desired distance.

As discussed briefly above, the preferred procedure for transposing rails having staggered joints is to first free the two rails and then to move both of the rails, either together or separately, using the cylinders 134 and 136 to move the rails relative toe the stationary machine 18 until the rails are in the desired position. Next the rails at one end are threaded through machine 18 so as to cross beneath it and the machine 18 moves toward the other end carrying the crossing point with it. When the machine has moved a short distance, the just-transposed ends are then connected permanently to their new joints and transposition is thereafter completed. When the other end is reached, the rails at that end are then connected to their new joints to complete the procedure. Connecting to the new joints just after starting considerably assists in ensuring that the transposed rails move to their new positions correctly. It will, of course, be understood that the rails can be moved along their length at any time including after the rails have been completely transposed.

Many changes and modifications of the above embodiments of the invention can of course be made without departing from the scope of the invention, and that scope is intended to be limited only by the scope of the appended claims.

What is claimed is:

1. Apparatus for transposing a pair of railroad rails of the type having staggered joints comprising:

means for moving each of said rails along its length in a direction and for a distance so that each rail can be attached to the joint formerly attached to the outer rail including clamping means adapted to be clamped to a rail, said clamping means including a clamping member having a passage for a rail and a wedge member having an eye for connecting said wedge member to hydraulic jack means and adapted to be fitted in said passage between said clamping member and said rail and hydraulic jack means connected to said clamping means for exerting a force on that rail to move it along its length, and

means for transposing said pair of rails including a vehicle having a frame and means to move said frame along said rails and wherein said moving means includes means attaching said hydraulic jack means to said frame, said attaching means attaching said hydraulic jack means pivotably to said frame so that said jack means is free to pivot about an axis substantially perpendicular to the direction of the force exerted by said hydraulic jack means.

2. Apparatus for transposing a pair of railroad rails of the type having staggered joints comprising:

means for moving each of said rails along its length in a direction and for a distance so that each rail can be attached to the joint formerly attached to the other rail including clamping means adapted to be clamped to a rail, said clamping means including a clamping member having a passage for a rail and an eye for connecting said clamping member to hydraulic jack means and a wedge member adapted to be filled in said passage between said clamping member and said rail and hydraulic jack means connected to said clamping means for exerting a force on that rail to move it along its length, and

means for transposing said pair of rails including a vehicle having a frame and means to move said frame along said rails and wherein said moving means includes means attaching said hydraulic jack means to said frame, said attaching means attaching said hydraulic jack means pivotably to said frame so that said jack means is free to pivot about an axis substantially perpendicular to the direction of the force exerted by said hydraulic jack means.

3. Apparatus for transposing a pair of railroad rails comprising:

frame means,

means for moving said frame means along said pair of rails,

four guide member means attached to said frame means with two of said guide members on one end of said frame means and two of said guide members on the other end of said frame means, each of said guide members defining a passage for a rail,

arm member means for each guide member connecting that arm member means to said frame,

first hydraulic jack means associated with each said arm member means for moving that arm member means vertically,

second hydraulic jack means associated with each said arm member means for moving that arm member means horizontally,

third hydraulic jack means associated with each said guide member means for rotating that guide member means, and hence a rail in said passage,

clamping means adapted to be clamped to a rail, and

fourth hydraulic jack means connected to said clamping means and to said frame means for exerting a force on the clamped rail so as to move the clamped rail along its length.

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